Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

Issued October 3, 1907.

United States Department of Agriculture,

FOREST SERVICE—CIRCULAR 59 (Revised).

GIFFORD PINCHOT, Forester.

FOREST PLANTING LEAFLET.

EUCALYPTS.

Eucalypts are native to the coast region of Australia and Tasmania, where at least 150 distinct species are recognized. More than 100 species have been introduced into the United States. They are, however, adapted to a subtropical climate, and only a limited portion of this country is favorable for their growth. The possibility of growing eucalypts in any region is determined by the amount of cold that the young trees have to endure. Few of the species can survive a temperature below 20° F., and none of them a temperature of less than 12°.

In general, eucalypts may be successfully planted in the sections of the United States suitable for the culture of citrus fruits. They are grown in nearly all the agricultural sections of California, along the coast of southern Oregon, and to a limited extent in Arizona, New Mexico, and western Texas. Several species have also been planted in Florida and along the Gulf coast. Here, however, occasional frosts have killed or severely damaged the trees, and for this reason planting has been discouraged.

Eucalypts have been planted most extensively in California, and there the value of different species may best be determined. The rate and habit of growth of the blue, sugar, and gray gums and a few other species make them superior to other eucalypts and recommend them especially for commercial plantations. Blue gum, one of the best commercial species, has been the one most widely planted. Its requirements, characteristics, and methods of propagation are typical of those of other timber eucalypts.

BLUE GUM (Eucalyptus globulus).

FORM AND SIZE.

Blue gum is an evergreen tree, with smooth, elongated, sickle-shaped leaves, dark green on both sides, and of leathery texture. The young leaves are of a globular shape and are covered with an oily bloom which gives them a bluish shade. The bark of the tree is smooth, and olive brown in color. The large, rounded, top-shaped seed-cases, covered with warty protuberances, furnish the most distinguishing characteristic of the tree.

Blue gum is one of the largest and most rapid growing trees in the world. In California, under favorable conditions, trees have attained a height of 175 feet and a diameter of 5 feet in twenty-five years. Although sometimes irregular in form, the tree tends to develop a straight, gradually tapering, unforked stem. In plantations the trunks become rapidly cleared of branches to a considerable height, but in the open, trees branch more widely, and gradually develop a short crown of massive, spreading branches.

RANGE.

Its intolerance of frost restricts the planting range of blue gum in this country almost entirely to the temperate valleys of California. Young blue gums are especially sensitive to frost, and will seldom endure a temperature below 24° F. Old trees are more hardy, and generally are uninjured by a temperature as low as 18°.

The planting range of blue gum in California includes the greater part of the agricultural area of the State. The tree resists drought to a moderate extent only, and becomes stunted when planted on dry uplands or in the hot interior valleys. It reaches its best development in the humid coast region and in the valleys which open from it.

HABITS AND GROWTH.

The most essential requirement of blue gum and other eucalypts is an adequate supply of soil moisture. A warm climate, a dry atmosphere, and a high percentage of sunlight furnish very favorable conditions, and when abundant moisture is found within from 10 to 15 feet of the surface blue gum will grow well even in dry situations. In the more arid interior valleys of California, however, where temperatures of from 110° to 140° F. occur, together with great atmospheric dryness or with hot, dry winds, the foliage of the tree is likely to be burned and injured.

Blue gum develops an extensive root system which penetrates deep into the soil in search of moisture. Where moisture conditions are suitable it will thrive on all kinds of soil. In California it grows best on deep, loose sandy loams, because these soils commonly occupy bottomlands which are fully supplied with soil moisture. In shallow soils overlying rock or hardpan, where the roots are forced to spread widely near the surface, the growth of the tree is usually stunted.

Blue gum grows well in situations where the ground water level is very close to the surface, and it will even endure standing water for short periods. It grows very rapidly under irrigation. As a rule, however, irrigated land is too valuable to be used for commercial plantations and usually it may be more profitably devoted to agricultural crops. Irrigation is not necessary for old, deep-rooted trees.

In situations along the coast where rainfall and soil moisture are deficient, fogs furnish an important source of moisture supply for eucalypts. Fogs frequently enable blue gum to make thrifty growth on dry upland situations in other respects very unfavorable for it.

Blue gum is relatively intolerant. Young seedlings thrive under considerable density of shade, but when rapid growth begins seedlings are unfavorably affected by shading. The intolerance of saplings and poles is in a measure indicated by rapid height growth, upon which they depend to escape suppression, and is further shown by the fact that even in the open the lower branches are shaded out by the upper branches, so that the trunks rapidly clean themselves. This species may be grown in very dense plantations where all trees obtain an equal start.

Compared with most native trees, blue gum has a phenomenally rapid rate of growth. Seedling stands will average a height growth of 50 feet in six years and 100 feet in ten years. Under very favorable conditions individual trees have reached a height of 125 feet and a diameter of 36 inches in nine years. In sprout stands growth is even more rapid; trees frequently reach 3 inches in diameter and 35 feet in height in eight months, while in three years a diameter of 7 inches and a height of 70 feet are often attained.

Blue gum is practically immune from disease. Where trees are reproduced by sprouts, the old stumps frequently decay slowly at the heart, while the sprouts remain unaffected. Growing trees are not attacked by insect enemies, but felled timber lying unbarked upon the ground is subject to injury by a wood-mining insect.

Blue gum rarely suffers any breakage of the limbs from winds, and the spreading root system renders the trees very wind-firm. However, severe and constant winds have a very injurious influence upon the growth of all eucalypts. Inland winds cause little damage. Along the coast, however, exposed trees show the effect of the strong western winds in distorted form and stunted growth; they gradually become defoliated and are sometimes killed.

Fire is the greatest source of injury to eucalyptus plantations. Both the natural characteristics of the trees and the conditions within planted groves render them peculiarly susceptible to fire injury. The large quantity of litter—dry leaves, branches, and shredded bark—which accumulates beneath a stand is extremely inflammable. The bark of eucalypts is so thin that the trees are injured even by light surface fires.

ECONOMIC USES.

The wood of blue gum is very heavy, hard, strong, and tough, but it is not durable in contact with the soil. It is close-grained, and is split with difficulty after it has dried. It is less elastic than hickory, but it has been demonstrated by mechanical tests that seasoned blue gum timber is very little inferior in strength and stiffness to the best second-growth hickory. In appearance it closely resembles the wood of hickory and ash.

Blue gum timber is utilized for a great variety of purposes in California. The wood is excellent for fuel, and in the treeless valleys has been the chief fuel supply for many years. In southern California the steady demand renders commercial planting for fuel very profitable. Eucalyptus timber has been extensively used in California for wharf piling. Blue gum piles are in use in nearly every port on the California coast, and extended trial has shown that they resist the attacks of marine borers which destroy timber in sea water longer than other species commonly used for piling. Blue gum timber has also been used to some extent for fence posts and telephone poles. The wood is not suitable for this purpose, however, on account of its short life in the ground. Seasoned posts last a little longer than green posts, and timber cut from the heart is more durable than sapwood.

Blue gum timber has been used to a limited extent to determine its value for railroad ties. The results thus far obtained indicate that it compares favorably with second-grade pine tie timber. In case blue gum ties gain a place in the market it may be profitable to plant the tree for that purpose. However, if commercial plantations are to be established for ties, sugar gum should be used in preference to blue gum, on account of its greater strength and its greater durability in contact with the soil.

In recent years blue gum has been manufactured into lumber, and has come into favor for many uses. Its strength and toughness have led to its use as a material for vehicle construction with very satisfactory results. A just appreciation of the qualities of gum timber will encourage extensive commercial planting, and so furnish an important source of hardwood timber supply for the Pacific coast.

The lumber has been extensively used for vehicle stock and for the wooden parts of agricultural implements. It is also made into insulator pins for electric wiring, and is used for furniture and cabinetwork, hardwood flooring, trip-hammer beams, the levers of windlasses, and the blocking for oil and wine presses, wood paving, pulley blocks, and belt wheels.

The extensive utilization of gum lumber has hitherto been prevented chiefly by the scanty supply of timber of merchantable size and by the difficulty experienced in seasoning the lumber without warping and checking. It is believed, however, that in the seasoning of gum no greater difficulties will be encountered than in the seasoning of any other hardwood of similar density and strength.

The esteem in which eucalyptus timber is held in California is based upon the exclusive use of blue gum. In Australia, however, this species is considered inferior in strength and timber value to several other eucalypts. Strength tests of the timber of blue gum and other eucalypts grown in California have sustained this opinion. It is therefore probable that eucalypts are destined to enjoy yet greater favor when these other species become more widely used.

A product of considerable importance derived from blue gum is the oil distilled from the leaves. Eucalyptus oil is recognized as a valuable drug and is extensively used by pharmacists and physicians.

In many valleys of California eucalyptus windbreaks are considered absolutely necessary to insure the successful production of crops. They have been most extensively used to safeguard citrus orchards from strong and destructive winds in southern California, but they are now being established also for the protection of vineyards and orchards of deciduous fruits, olives, and walnuts. The blue gum excels other species for windbreak purposes on account of its height and the rapidity of its growth. The tall shafts of the trees bend before the wind and act as a cushion to deflect it upward over an orchard, whereas ordinary windbreak trees form a more solid wall and the wind draws downward, forming eddies near the leeward side.

Eucalyptus windbreaks planted every quarter mile across level country will give effective protection. Near the foothills the belts should be planted closer, since winds blowing down from the mountains gather greater velocity. Through orchards they should generally be planted at intervals of about 200 feet. Where winds are very severe, double or triple rows of trees should be planted. The best spacing of blue gum trees for protective planting is 4 feet apart each way. In double rows the trees of one row should be planted opposite the center of the spaces in the other. The most effective windbreak protection is secured by a combination of Monterey cypress and blue gum. The trees of each species should be planted in separate rows rather than alternated in a single line. The cypress row will then form a dense understory, closing up the lower openings left by the shed branches of the faster growing eucalypts.

Objection is often made to the blue gum for protective planting on account of its wide rooting habit. It is true that a windbreak draws much moisture from the soil, so that the adjoining rows of orchard trees are often rendered less productive. Wide extension of the roots may, however, be readily limited without injury to the windbreak. At a distance of from 6 to 10 feet from the windbreak a trench parallel to the trees should be dug to a depth of 3 or 4 feet, cutting off the surface roots of the gum trees. Such trenches should then be refilled, but should be reopened every second year.

METHODS OF PROPAGATION.

Eucalypts reproduce readily by both seeds and sprouts. The trees bear seed in abundance annually and under favorable conditions natural reproduction is freely established. Trees also sprout vigorously from both the stump and the roots, either after cutting or in response to injury. In California commercial groves are almost invariably reproduced by sprouts.

Plantations should be started with young trees and not by direct sowing. The opinion is generally held that eucalyptus seedlings are so difficult to raise that their propagation is impracticable except for expert nurserymen. In point of fact, blue gum is one of the most easily propagated species. With proper attention to details seedlings can readily be raised.

Seed can easily be collected for planting. The fruit ripens in late summer or fall, but it persists upon the branches and does not open to release the seed until the seed cases fall to the ground. Blue gum seed may frequently be gathered locally from felled trees. Since, however, the seed of the year is not yet ripe at the proper time for planting, it should be collected in the fall and stored until the next season. If kept dry and cool it will often retain its vitality for from four to five years. After the fruit has been collected it should be spread upon sheets in the sun. The seed cases will open and release the seed in a few days. The seed should then be screened or winnowed in order to separate it from the hulls and chaff.

When only small quantities are required seedlings may be raised in small beds in a garden. They succeed better out of doors than when raised under glass. They require shade, however, and beds should be protected by lath screens to prevent full exposure to the sun. When seedlings are to be propagated on a large scale, a nursery should be established and an open frame covered with lath screening constructed for shelter. A well-drained, sunny exposure, as free as possible from danger of frost, should be selected for a nursery site. The character of the soil need not be considered, since soils should be prepared artificially for the propagation of seedlings.

Seedlings are sometimes raised in nursery beds and later transplanted into seed boxes. The best results, however, are obtained by using seed boxes exclusively. The raising of seedlings in pots is expensive and is not advisable when stock is to be grown in large quantities. The use of seed boxes allows suitable preparation of the soil, better control of the seedling root systems, and great convenience in handling and transporting the plants. The boxes should be rectangular, 24 by 30 inches in size, with a depth of 4 inches, and should be made of durable material.

The best results are secured from soils artificially prepared so that the composition and porosity of the mixture may exactly meet the needs of the seedlings. Fine sand should be mixed with a heavier soil and a small quantity of partly decayed leaf mold. For propagating boxes the soil should be porous and sandy, in order to insure rapid drainage; for transplant boxes it should be heavier, so that a portion may be taken up about the roots of the seedlings when they are being set out in a plantation.

Stock from 6 to 12 inches tall is of the best size for commercial planting, because it is less expensive to plant, endures transplanting better, and grows more thriftily than larger stock. Eucalyptus seedlings reach this size in from three to six months after the seed is sown. Blue gum stock requires only three or four months to reach the height of 12 inches. The best planting season comes, in most parts of California, in the later winter months, and blue gum seeds should be sown in September, in order that the seedlings may reach the proper size at the proper time.

Seed should be sown broadcast, evenly but not too thickly, over the moistened surface of the soil in the seed boxes. One pound of blue gum seed should produce 10,000 or 12,000 seedlings. A density of not more than 1,000 plants to a seed box gives the best results. After sowing the seed should be covered a little deeper than its thickness with fine sand. The surface of the boxes should then be covered with fine sawdust to retain the moisture and prevent washing out the seed when the boxes are being watered. The soil should be kept thoroughly moist until germination begins. During warm weather this will be in from four to ten days.

After the seed has germinated, the regulation of the water supply requires constant and careful attention. Care in satisfying but not oversupplying the needs of plants for moisture will prevent nearly all difficulties experienced in raising them. The chief danger to young seedlings arises during the first two months from their susceptibility to "damping off"—the name given to a fungous disease which results from an excess of moisture in the soil or in the atmosphere. A large number of seedlings may die from this disease in a very short time if effective measures of relief are not taken. However, the amount of soil moisture may easily be regulated, and wind and sunshine will hasten evaporation and prevent or quickly check "damping off." In wet, humid weather seedlings should not be watered and a free circulation of air should be insured.

Seedlings need abundant moisture for thrifty growth and should usually be watered daily. The best time for watering is in the forenoon, but not so early that any excess moisture can not be speedily evaporated. The rate of growth of nursery stock may be regulated by watering; plants may be forced by an abundant supply of moisture or their growth may be retarded by scant watering. Just before planting the amount supplied should be reduced, in order to harden the plants.

Seedlings generally come up very thick in a seed box. When they have reached the height of about 2 inches, they should be taken up and replanted, 100 in a box, in fresh soil, in order to give them more growing space. They must be handled carefully, and their roots should be exposed no longer than necessary. They will wilt slightly after transplanting, but will revive if shaded and watered freely. Transplanting should be done on damp, cloudy days, since seedlings wilt less on such days. For a month before planting, nursery stock should be accustomed to full sunlight by gradually removing the lath shade frames under which they have been raised.

PLANTING.

In California the proper time to plant eucalyptus seedlings is, as has been said, during the rainy season in winter and spring months. In order to become firmly established young trees need abundant moisture, so that they may be able to endure the long period of drought which extends through the summer and fall. After the winter rains begin, planting need be deferred only long enough to avoid the danger of frost. Eucalyptus seedlings are very sensitive to frost, and on this account planting must be delayed until danger from severe late frosts is safely past. The proper season for planting varies in different years and in different localities. On elevated situations and along the coast planting may be begun early in the rainy season, while in low, frosty valleys it should be delayed until the spring months. Mild, cloudy, or rainy days should be selected.

Planting sites should be prepared as thoroughly as for field crops. The use of seed boxes allows the seedlings to be transported to the planting sites without any interference with their growth. At the time of planting the boxes should be carried down the rows and the trees taken up, one by one, as required. Seedlings should be carefully handled in planting in order to avoid injuring them. By taking up a small block of soil with each plant, the plants may be set in the ground with very slight disturbance to their roots. For planting on well-prepared sites a small trowel is the best implement to use in lifting seedlings from seed boxes and setting them out. Under average conditions a planter should set out from 500 to 800 seedlings a day.

Blue gum trees should be set 8 feet apart each way. Most other eucalypts should be planted 6 by 6 feet apart. This comparatively close spacing is desirable in order that forest conditions may be established as speedily as possible with straight trees, clear of branches.

Eucalypts should not be planted in mixture with other trees, and when different eucalypts are used they should be planted in separate blocks.

CULTIVATION AND CARE.

Blank areas frequently occur in young plantations where the young trees have been killed by late frosts or have died during the first summer from drought or from the attacks of small animals. The loss of an occasional tree is not a matter of concern, but where large and frequent blanks occur replanting is essential to secure a full stand. Seedlings should be reset as early as possible in the life of a plantation or they will be overtopped and suppressed as soon as the rapid height growth of the older stock begins.

The long period of drought during summer and fall in California is unfavorable for the growth of young trees. Soil moisture becomes deficient, and trees, if neglected, are likely to die from drought. Young plantations should be cultivated as thoroughly as an orchard or field crop. By this means weed growth will be kept down and the trees stimulated to rapid growth in height. Cultivation should begin toward the close of the rainy season, and should be repeated at intervals of about a month until the fall rains commence. During the second year it should be continued until the plantation becomes too dense for easy passage down the rows. Blue gum plantations will establish cover over the soil in from one to two years. The soil will then be amply protected from drying out and cultivation will no longer be required.

Eucalyptus plantations require protection from injury by animals and fire. Stands are considerably damaged by cattle tramping and packing the soil. For this reason plantations should be fenced.

The greatest damage from animals is done by small rodents at the time when plantations are being started. Rabbits, rats, and ground squirrels frequently eat the leaves and young shoots of small seedlings or bite their stems off close to the ground. Gophers often eat their roots. If unchecked, this damage may be serious. When the ravages of animals are noticed in a plantation such methods of poisoning as are familiar to every rancher should be used.

A single fire will frequently ruin a eucalyptus plantation. Fire protection must therefore be assured. When fire gains access to a plantation the oily litter burns so fiercely that it can scarcely be extinguished before the whole grove is burned over. In this way the litter is destroyed and the soil is exposed to drying, while the bases and roots of the trees are generally so much injured that the stand will slowly die. After a severe fire it is advisable that the burned area be cut clear, even if the trees are not yet of merchantable size.

A practical way of protecting small groves from fire is to plow a strip of land around them during the summer dry season. Larger groves should be divided into blocks by occasional roads which may be kept cleared to serve as fire lines. Should fire enter a grove, every effort should be made to confine it to a small area by raking the ground clear of litter, so as to form a temporary fire line.

After a few years' growth eucalyptus plantations generally become so dense that the trees cease to increase rapidly in diameter. Fuelwood groves will not require thinning, but in timber plantations which are to grow more than from six to ten years thinning is necessary, in order that the individual trees may have sufficient growing space. Thinning will be followed by faster growth. The inferior trees should be selected and so cut that no large openings are left in the stand.

After a grove is cut the stumps send up a great number of sprouts. If the grove is intended for fuel wood production it may be reproduced after cutting by the growth of the sprouts. Natural thinning of the sprout clumps should not be awaited, but all except three to five of the straightest and most vigorous shoots should be trimmed from the stump after the first year's growth. If the grove is to be devoted to timber production all of the sprouts except the one showing the most thrifty development should later be removed.

When sprout reproduction is desired the proper time for cutting is in the winter rainy season, between the months of November and April. At this season soil moisture is abundant, and hence the stumps sprout vigorously and are not likely to dry out and die. When trees are cut in the late spring or summer sprout growth is less vigorous and groves are likely to become less productive. Sprout growth is most vigorous from low, clean-cut stumps, and care should therefore be exercised in felling trees. Stumps resist decay longest when cut with a slant to prevent the collection of moisture. After groves have been cut for fuel several times at short intervals they thin out and decrease in rate of growth and yield. When this point is reached it will be more profitable to replant than to reproduce the stand further by sprout growth.

COST OF PLANTING AND RETURNS.

The benefits secured from windbreaks usually warrant their planting without special consideration of cost. Commercial plantations, however, should be established at the lowest possible cost, in order to secure the largest possible balance of profit when they are exploited. When plant material is purchased from dealers, the total cost of setting out plantations and of cultivating them for two years will average from $25 to $30 per acre. However, the cost of planting large areas with stock grown in a well-managed home nursery should not exceed $15 or $20 per acre. Careful management will reduce the planting cost, but it is poor economy to save at the expense of necessary care and cultivation. After the first two years the only cost of a plantation beyond the rental value of the land will be the cost of protection.

Returns may be had from blue gum plantations in from four to six years if they are cut for fuel wood. Merchantable saw timber may be produced in from twenty to thirty years.

Under favorable conditions seedling groves yield, on the average, from 35 to 45 cords of fuel wood per acre in eight or nine years. Fuel wood should, however, be produced from sprout groves rather than from seedling groves, because sprout stands grow more rapidly. In five years they yield from 30 to 50 cords per acre, and in six years from 40 to 60 cords. The New England cord of 128 cubic feet is here referred to, but a short cord of 96 cubic feet is used in California, and to change the yield mentioned into California cords the amount should be increased one-third.

Fuel brings about $3 per cord on the stump. The average cost of cordwood manufacture is from $2 to $3, and the price of seasoned cordwood varies from $5 to $15 per cord in different markets. Fuelwood groves may be cut from two to four times at intervals of from four to eight years. After the first cutting the net returns from the tree crop will be greater, because an expenditure for planting and cultivation will not be required. Under average conditions seedling groves reach their maximum yield of fuel wood between the eighth and tenth years of growth, while sprout groves reach this period by the fifth or sixth year. The year when they should be cut is thus indicated. Blue gum seedling groves reach their maximum yield of saw timber between the thirtieth and fortieth years of growth. A yield of 32,000 feet board measure per acre is obtained in thirty years from seedling stands under average conditions. Lumber commands a price of from $100 to $125 per thousand feet in the limited market which it has found in California. Blue gum pile timbers bring from $5 to $15 apiece on the stump.

SUGAR GUM (Eucalyptus corynocalyx).

For planting in California sugar gum is one of the most valuable of the commercial eucalypts, on account of its adaptability to situations where many other species will not thrive.

The shorter and brighter green leaves distinguish this species from blue gum, and the tree develops a more excurrent crown. The young bark is cream colored, and, owing to the flaking off of the older, darker bark, the trunk of the tree has much the appearance of a sycamore.

The planting range of sugar gum is somewhat restricted by its susceptibility to injury from frost. Young trees will rarely endure greater cold than 25° F., but this species excels other timber eucalypts in endurance of drought. It is adapted to dry uplands, and timber may be raised in dry situations and in the mountain foothills where other eucalypts will not attain merchantable proportions. It is the species to be chosen for planting in situations too dry for the growth of blue gum.

Sugar gum clears its trunk rapidly of limbs, even when grown in open stand. The characteristic straightness of its stem makes it especially valuable for timber. It is of slower growth than blue gum, but it reaches proportions suitable for merchantable timber. It has been planted only within recent years, but with from ten to fifteen years' growth trees reach diameters of from 12 to 16 inches and heights of from 100 to 140 feet.

The characteristics of the wood are similar to those of blue gum but it is straighter grained and easier to split. For fuel wood it is superior to blue gum. The wood is also more durable in contact with the soil than that of most other eucalypts. Green posts last from four to six years, and seasoned timber is even more durable. Sugar gum piles prove more lasting than blue gum. The timber is also superior in strength and is one of the strongest among commercia eucalypts. It is suitable for vehicle stock and for many other uses

LEMON GUM (Eucalyptus citriodora).

Lemon gum is characterized by its clear, straight trunk and by the violet or lavender color of the bark. Its leaves are more delicate and of thinner texture than blue gum. The tree may also be recog nized by the strong, pleasant lemon scent of the foliage. The planting range of lemon gum is restricted by the susceptibility of the tree to injury from moderate frost. It is not suitable for planting upon the lower levels of the valleys. It is moderately drought resistant, however, and grows thriftily upon many dry upland situations. Lemon gum makes slightly more rapid growth than sugar gum. The timber is strong and moderately durable. The straight, clear form recommends the tree for commercial planting.

GRAY GUM (Eucalyptus tereticornis).

Gray gum has a wide planting range on account of its ability to endure considerable drought and cold. It grows less rapidly than blue gum, but it furnishes a strong, valuable timber and develops a clear straight bole suitable for commercial purposes. The wood is moderately durable in contact with the soil.

OTHER EUCALYPTS.

Both red gum (*Eucalyptus rostrata*) and manna gum (*Eucalyptus viminalis*) have been recommended for commercial planting in California and have been grown to a limited extent. Both species will stand considerable drought and cold, and they may be grown successfully in situations unsuitable for the blue gum and the sugar gum. They grow rapidly and furnish strong timber. Both species yield good fuel wood, and red gum timber is moderately durable in contact with the soil. These species can not be so strongly recommended for commercial planting as those previously described, because they possess a strong tendency to irregular growth and develop a form unsuitable for merchantable timber.

O